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NOTE ON SECOND SOLUTION OF PROBLEM 49, MECHANICS.

By ALFRED HUME, C. E., D. Sc., Professor of Mathematics, University of Mississippi, University P. O., Miss.

My work as published in the June-July number is the solution of the following problem :

A uniform bar, whose other dimensions may be neglected in comparison with its length ($2a$), is placed in vertical position on the edge of a platform of given height and, being slightly displaced from the vertical, is caused to revolve about the edge as an axis, the lower end being set free when the bar becomes horizontal. Where and in what manner will it strike the ground ?

The discussion of either problem—the one just stated or the one actually proposed—naturally divides itself into two parts, the first dealing with the motion before, the second after, the stick leaves the platform. It was the latter that chiefly occupied my thoughts when I prepared the solution referred to above.

I now offer the following as a discussion of the first part :

Let m =mass of stick,

$2b$ =length of stick,

$2a$ =other dimension perpendicular to edge of platform,

θ =angle through which stick has turned in t seconds,

ω =angular velocity at time t .

$$\frac{d^2\theta}{dt^2} = \frac{mgbs\sin\theta}{m\{[(a^2+b^2)/3]+b^2\}} = \frac{3bs\sin\theta}{a^2+4b^2}g; \quad \omega^2 = \left(\frac{d\theta}{dt}\right)^2 = -\frac{6b\cos\theta}{a^2+4b^2}g + c,$$

or, since when $\theta=0$, $\omega=0$,

$$\omega^2 = \frac{6bg}{a^2+4b^2}(1-\cos\theta). \quad \text{Normal acceleration} = b\omega^2 = \frac{6b^2g}{a^2+4b^2}(1-\cos\theta).$$

Component of acceleration due to gravity directly opposite to this= $g\cos\theta$.

At the instant these become equal the contact between stick and platform ceases.

This occurs when $\cos\theta = (6b^2)/(a^2+10b^2)$.

Up to this time (friction being supposed sufficiently great to prevent sliding) the stick has turned about the edge of the platform. After leaving the platform the center of gravity of the stick describes a parabola, and the stick revolves with a constant angular velocity, ω , about its center of gravity. This part of the motion might be discussed as in the June-July number.

DIOPHANTINE ANALYSIS.

58. Proposed by E. S. LOOMIS, Ph. D., Professor of Mathematics in Cleveland West High School; Berea, O.

The base of a right-angled triangle is 105; find all the perpendiculars and hypotenuses to fit it, such that their values shall be integers.

I. Solution by the PROPOSER.

1. Let the hypotenuses and sides of a right-angled triangle be represented by m^2+n^2 , m^2-n^2 , and $2mn$.